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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|-----------------------------|------------------------|
| 10/814,435 | 03/30/2004 | Sean K. Lehman | IL-10883 | 5470 |
| 7590 | 08/08/2007 | | | |
| Michael C. Staggs Lawrence Livermore National Laboratory P.O. Box 808, L-703 Livermore, CA 94551 | | | EXAMINER LAMPRECHT, JOEL | |
| | | | ART UNIT 3737 | PAPER NUMBER |
| | | | MAIL DATE 08/08/2007 | DELIVERY MODE PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | |
|------------------------------|------------------------|---------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/814,435 | LEHMAN, SEAN K. |
| | Examiner | Art Unit |
| | Joel M. Lamprecht | 3737 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 3/30/04.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-50 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-50 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 30 March 2004 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/30/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1, 3-9, 11-12, 14, 16, 17, 19, 20, 22, 24-30, 32-37, 39, and 41 are rejected under 35 U.S.C. 102(e) as being anticipated by Cespedes et al (US 2003/0199767). Cespedes et al disclose a wave-based imaging method and apparatus comprising directing energy waves outward along a predetermined axis (0005-0008), receiving energy waves from one or more objects and processing the received waves including applying an algorithm to map location and parameter of the received energy waves to image those objects (0164-0189), including an annular array comprising multiple fixed transducer elements capable of launching a field wave as well as a single transducer array capable of rotating up to 360 degrees about a rotational axis (0162,

0187-0188), said transducer is arranged about a distal end of a catheter, is able to receive approximately 90-degrees of content from radial-scattered waves (0175, 0189), image acquisition is capable of being formed along a plane perpendicular to the axis of rotation (0005, 0096), frequencies of transmission lie between 100 Hz and 10Ghz (0111), the interspace includes a living vessel (0089-0090), the received energy is able to help determine the risk of rupture or thrombosis (0141), the transducers are able to obtain measurements regarding external pressure to the artery (0115-0118, 0159-0160), and then characterize the plaque elements which exist within the artery (0115-0118, 0159-0160, 0165).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 18, 23, 31, 45-47, 49, and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cespedes et al (US 2003/0199767). Cespedes et al disclose all that is listed above, mainly a wave-based imaging method and apparatus comprising directing energy waves outward along a predetermined axis (0005-0008), receiving energy waves from one or more objects and processing the received waves including applying an algorithm to map location and parameter of the received energy waves to

image those objects (0164-0189), including an annular array comprising multiple fixed transducer elements capable of launching a field wave as well as a single transducer array capable of rotating up to 360 degrees about a rotational axis (0162, 0187-0188), said transducer is arranged about a distal end of a catheter, is able to receive approximately 90-degrees of content from radial-scattered waves (0175, 0189), image acquisition is capable of being formed along a plane perpendicular to the axis of rotation (0005, 0096), frequencies of transmission lie between 100 Hz and 10Ghz (0111), the interspace includes a living vessel (0089-0090), the received energy is able to help determine the risk of rupture or thrombosis (0141), the transducers are able to obtain measurements regarding external pressure to the artery (0115-0118, 0159-0160), and then characterize the plaque elements which exist within the artery (0115-0118, 0159-0160, 0165).

Cespedes et al do not specifically disclose which algorithm they use to map angular location and frequency parameters, but use finite area relations in Euclidean space and vector functions in 2/3d planes to acquire wave data which in turn helps acquire angular location of the return signals. The specific application of a "Hilbert space inverse wave" algorithm is not discussed but for a finite dimensional space the application of the more generalized Hilbert space would appear very similar to a conventional inverse wave problem in Euclidean space. That is, given certain knowledge of the area being imaged, and the waveforms being sent and received, a problem solved on the basis of Hilbert space will intuitively acquire the same properties of a finite dimensional problem. Angular locations and distances represented by the dot

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product or other functional expressions (FFT, Helmholtz) in Euclidean space correlate to the same problem within a finite Hilbert space. The knowledge required of one skilled in the art at the time of the invention to perform the angular locations disclosed by Cespedes could be characterized as Hilbert space inverse wave problems where specific properties of vector space are known as disclosed in Cespedes in (0005-0007, 0173-0176, 0154-0157). Therefore it would have been obvious to one of ordinary skill and creativity in the art at the time of the invention to have applied a Hilbert space inverse wave algorithm to the angular location methods of Cespedes if a more-general solution set was desired.

5. Claims 10, 21,38, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cespedes et al in view of Sieben (US 5,353,798). Cespedes et al discloses the invention substantially as mentioned above but does not disclose the use of frequencies in the range of 20 Mhz to 60Mhz. Attention is then directed to the reference by Sieben, which discloses and teaches the use of frequencies within that range accompanying an ultrasound application much like those pursued by Cespedes et al (Col 45 line 60 – Col 46 Line 30). It would have been obvious to one of ordinary skill in the art at the time of the invention to have included the range of frequencies disclosed by Sieben in the methods of Cespedes for the purpose of allowing for faster sampling of the image data.

6. Claims 13, 15, 40, 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cespedes et al in view of Zhdanov (US 6,876,878 B2). Cespedes et al discloses the invention substantially as noted but fails to disclose using their system

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for the purposes of analyzing automobile parts, bore holes or a waste contaminant container. Attention is then directed to the secondary reference by Zhdanov which discloses medical ultrasound adaptations in a wide variety of applications including those of bored holes in supports, automobile parts and other similar hollowed masses (Col 13 Line 20-40). It would have been obvious to one of ordinary skill in the art at the time of the invention to have incorporated the applications of Zhdanov with the devices of Cespedes to adapt the ultrasound system for performance in the previously mentioned applications for the purpose of obtaining information about cylindrical mediums via ultrasound.

Conclusion

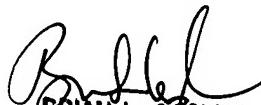
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joel M. Lamprecht whose telephone number is (571) 272-3250. The examiner can normally be reached on Monday-Friday 7:30AM-4PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian L. Casler can be reached on (571)272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JML
7/31/07



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